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10/528,990

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Steven Morrison

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EXAMINER

BLOOM, NATHAN J

ART UNIT

PAPER NUMBER

2624

MAIL DATE

DELIVERY MODE

05/01/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/528,990	Applicant(s) MORRISON ET AL.	
	Examiner NATHAN BLOOM	Art Unit 2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 22 January 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 26-51 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 26-51 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Applicants' response to the last Office Action, filed on January 22nd, 2008 has been entered and made of record.

Applicants' amendment had required new grounds of rejection. New grounds of rejection are therefore presented in the Office Action.

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 26-31, 33, 35-38, 40, 42-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar (US 2001/0038718) in view of Kain (US 2003/0048357).

Instant claim 26: An apparatus for presenting a highly spatially accurate visualization of a scene from which measurements can be taken, the apparatus comprising:

at least one camera ~~for recording~~ that records a plurality of frames of video images of the scene; [Figure 1, paragraphs 0029 and 0031]

at least one sensor mounted in relation to the camera ~~for recording~~ so as to record sensor data on positional characteristics of the camera as the at least one camera is moved with respect

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to the scene; and [*Camera is mounted on an airplane (figure 1) with an ESD module that is a sensor module that generates positional and attitude information (paragraphs 0033 and 00041).*]

an image processing means processor, including;

a first module ~~for synchronizing the frames with the sensor data to form~~ that uses the recorded sensor data to compensate for an effect of the positional characteristics of the camera on the frames and provide corrected frames[,]; and [*Kumar teaches an ESD module that records data and matches it with the video data, and also uses it for general alignment of the video frames (see paragraphs 0033-0034 and 0041-0043) and uses reference image data to further align the images, but does not teach the compensation of the positional characteristics on the frame. However, Kain teaches the positional compensation of the frames using sensor data in paragraphs 0005, 0026, and 0039. It would have been obvious to one of ordinary skill in the art to substitute the alignment (image features are used to align/compensation) method of Kumar with the compensation method of Kain to obtain the predictable result of aligning image data and compensating for positional shifts.*]

a second module ~~for constructing~~ that constructs an accurate mosaic from the corrected frames. [*See above, wherein Kumar in view of Kain have taught the construction of an accurate mosaic of video frames.*]

Instant claim 27: The apparatus as claimed in claim 26, wherein the at least one camera is a video camera capturing two dimensional digital images. [*The input images (video frames) referred to in paragraph 0031 of Kumar are inherently two-dimensional.*]

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Instant claim 28: The apparatus as claimed in claim 26, wherein the at least one sensor comprises a sensor capable of making a positional measurement. *[See paragraph 0033 of Kumar wherein positional (GPS) measurements are taken by an ESD sensor module, and paragraph 0026 of Kain.]*

Instant claim 29: The apparatus as claimed in claim 28, wherein the at least one sensor comprises a digital compass. *[See paragraphs 0005 and 0026 of Kain wherein positional and attitude information are taken, which encompasses orientation and position of the platform.]*

Instant claim 30: The apparatus as claimed in claim 28, wherein the at least one sensor comprises an altimeter ~~and/or bathymetric sensor~~. *[Kain teaches the use of altitude information in paragraph 0039, and thus the sensor unit taught by Kain must include an altimeter or equivalent device.]*

Instant claim 31: The apparatus as claimed in claim 26, wherein the at least one camera and the at least one sensor are mounted on a moving platform. *[Figure 1, wherein moving platform is an airplane.]*

Instant claim 33: The apparatus as claimed in claim 26, wherein the first module performs a perspective correction to the images using the sensor data. *[See paragraphs 0033, 0043, and 045-0046 wherein Kumar teaches the creation of the synthetic view that is a corrected perspective of the taken images. Furthermore, as per the rejection of claim 26, the positional*

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and orientation information obtained and used for determining the “perspective” of the camera are from the positional sensor.]

Instant claim 35: The apparatus as claimed in claim 26, wherein the apparatus further includes display means for providing a visual image of the mosaic. *[See figure 1 wherein user views displayed mosaic, and paragraphs 0029-0031 which discloses the display generation module.]*

Instant claim 36: The apparatus as claimed in claim 26, wherein the apparatus further comprises data storage means to allow the mosaic to be stored. *[Kumar discloses mosaicing the current video images and displaying them, but does not explicitly disclose the storage of the mosaic images. However, further matching and correspondence of these images with reference images is performed and various other operations and measurements are performed on this data. It is inherent that in order to perform these operations the video mosaic data is stored in a known storage medium such as the described components in paragraph 0030.]*

Instant claim 37: The apparatus as claimed in claim 26, wherein the apparatus includes a graphic user interface (GUI). *[See figure 1 and paragraphs 0029-0031 wherein the user interfaces with the displayed images.]*

Instant claim 38: Claim 38 describes the method performed by the apparatus of claim 26. As per rejection of claim 26 the system and method have been taught by Kumar in view of Kain.

Instant claims 40 and 42: Claims 40 and 42 describes the method performed by the apparatus of claim 33 and 35, respectively. As per rejection of claims 33 and 35 the system and method have been taught by Kumar in view of Kain.

Instant claim 43: The method as claimed in claim 38, ~~wherein the method further includes the step of~~ further comprising taking a measurement from the visual image. [*See paragraph 0077 wherein the geo-spatial location of a user selected point is measured from the visual image.*]

Instant claim 44: The method as claimed in claim 38, ~~wherein the method further includes the step of~~ further comprising storing the images so that they may be accessed by spatial position. [*See paragraph 0005 wherein included by reference is a method of forming a mosaic and accessing the images based on based on geo-coordinates (spatial position).*]

3. Claims 45 and 47-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar in view of Kain as applied to claims 26-31, 33, 35-38, 40, and 42-44 above, and further in view of Linnett ("Underwater Video Mosaicing For Seabed Mapping").

Instant claim 45 describes the method performed by the system of claim 26 (corresponding method claim is 38), and as per rejection of instant claims 26 and 38 the method have been disclosed except for the limitation wherein the method is performed in a fluid-like environment. Kumar and Kain have taught an airplane that does its measuring, image taking, and mosaicing above ground, but not underwater. However, Linnet teaches the underwater imaging and mosaicing of the seabed using an AUV (similar to an ROV but is mostly autonomous). It would

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have been obvious to one of ordinary skill in the art to combine the mobile platform image system taught by Kumar in view of Kain with one (as taught by Linnet) that is operable in a “fluid” (underwater environment) to increase the accuracy of the underwater mobile image mosaicing platform. Furthermore, the operating environments are very similar (both require the measurement and analysis of height and orientation) with respect to image compensation.

Instant claim 47-48 and 50: These limitations have been taught as per rejection of claims 45, 35-36, 38, and 43.

Instant claim 51: The apparatus as claimed in claim 28, wherein the at least one sensor comprises a bathymetric sensor. *[As per the rejection of claims 26, 28, and 30 the use of height (altitude) information for correction of image data was known to one of ordinary skill in the art. Kumar in view of Kain do not teach the use of a bathymetric (depth) sensor, but do teach the measurement of height (altitude) information using an appropriate sensor. Also, as per the rejection of claim 45 it would have been obvious to utilize the system as taught by Kumar and Kain in an underwater vehicle as taught by Linnet. Since the two applications are analogous in that they require 3D information for image correction, it would have been obvious to one of ordinary skill in the art that as a result of the combination of the teachings to utilize appropriate sensors in order to collect the necessary height information.]*

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Instant claim 49: The method as claimed in claim 45, wherein the platform is mounted on a remotely operated vehicle (ROV). *[See rejection of claim 45 wherein Linnet teaches an AUV, which is an ROV that is at least semi-autonomous.]*

4. Claims 32 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar in view of Kain as applied to claims 26-30 and 38 above, and further in view of Hall (“Image Registration and Mosaicing Using a Self-Calibrating Camera”).

Instant claim 32: The apparatus as claimed in claim 26, wherein the apparatus further includes a calibration system from which the at least one camera is calibrated. *[Kumar in view of Kain has taught the system described in claim 38 as well as the purpose of the invention in paragraphs 0006-0009 (Kumar) which is to provide a more accurate imaging and mosaicing system, but do not teach the calibration or the inclusion of a calibration system for the system. However, Hall teaches a self-calibrating camera specifically for image registration and mosaicing. In the 1st paragraph of the introduction Hall provides the motivation for using a self-calibrating camera, which is to improve the accuracy of image registration and mosaicing systems. Thus it would have been obvious to one of ordinary skill in the art to combine the teachings of Kumar in view of Kain with Hall to increase the accuracy of the image mosaicing.]*

Instant claim 39: Claim 39 describes the method performed by the system of claims 38 and 32 and as per rejection of claims 38 and 32 the system and its corresponding method have been taught.

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5. Claim 46 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar and Kain in view of Linnett (“Underwater Video Mosaicing For Seabed Mapping”) as applied to claim 45 above, and further in view of Hall.

Instant claim 46: The method as claimed in claim 45, ~~wherein the method further includes the step of further comprising~~ of pre-calibrating the camera to compensate for distorting artifacts inherent within the camera. *[See rejection of claims 45 wherein it would have been obvious to combine teachings of Kumar and Kain in view of Linnet, and claims 32 and 39 wherein it would have been obvious to combine the teachings of Kumar and Hall. Furthermore, given that Kumar, Kain, and Linnet have taught mobile image mosaicing platforms with a need for accuracy, it would have been obvious to one of ordinary skill in the art to provide a self-calibrating camera, as is taught by Hall, to either maintain or increase the accuracy of the mobile platform throughout the imaging process.]*

6. Claims 34 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar in view of Kain as applied to claims 26-30 and 38 above, and further in view of Ham (US 2002/0101438).

Instant claim 34: The apparatus as claimed in claim 26, wherein the second module accomplishes video mosaicing via a correlation technique based on frequency contents of the images being compared. *[Kumar in view of Kain has taught various methods of correlating (corresponding, matching, registering) the series of images with a known set of reference images, but does not accomplish the mosaicing using the frequency (phase) correlation technique. However, Ham has taught in paragraphs 0006, 0015, 0028, and figure 5 the*

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mosaicing of images by phase correlation, which is a frequency correlation technique. It would have been obvious to one of ordinary skill in the art that the substitution of a known image registration technique that can be used for image mosaicing, as is taught by Ham, for the registration technique taught by Kumar would provide a predictable result (a set of mosaiced images)]

Instant claim 41: Claim 41 describes the method performed by the system of claims 38 and 34 and as per rejection of claims 38 and 34 the system and its corresponding method have been taught.

Response to Amendment

7. The 35 USC 112 rejection of claim 30 has been withdrawn due to the amendment submitted on 01/22/2008.

Response to Arguments

8. Applicant's arguments with respect to claim 26-50 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan Bloom whose telephone number is 571-272-9321. The examiner can normally be reached on Monday through Friday from 8:30 am to 5:00 pm (EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Samir Ahmed, can be reached on 571-272-7413. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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